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Z125-3301-X

IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1 (74X9982)

Statement of Limited Warranty

The IBM RT PC[1] Personal Computer AT Coprocessor Services Licensed Program, Version 1.1, is warranted to conform to this Program Specification when properly used in its designated operating environments.

Any other documentation with respect to this licensed program is provided for information purposes only and does not extend or modify this IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1, Program Specification.

The IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1, Program Specification may be updated from time to time. Such updates may constitute a change to these specifications.

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This limited warranty and the 90-day program media warranty are contained in the IBM Program License Agreement supplied with this product. These warranties are available to all licensees of the IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1. The limited warranty period is until February 1, 1988, or until six months after written notice by IBM that the warranty period has been terminated, whichever is sooner.

Statement of Function Warranted

The IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1, (74X9982) provides the capability, in conjunction with a properly configured and programmed IBM RT PC, for many Personal Computer AT programs to run on the IBM RT PC without modification or recompilation. Programs that contain timing dependent code, access the disk file directly (bypassing BIOS), or use display features not available on the IBM RT PC, are examples of programs that will require modifications before executing on the Coprocessor. Programs on the Coprocessor can execute concurrently with programs running on the IBM RT PC AIX[2] Operating System. The performance of programs running on the Coprocessor will vary depending on the system configuration and system load. This performance will be less than an IBM Personal Computer AT.

The highlights of this licensed program are:

- Execution of many IBM Personal Computer AT BASIC and object code programs
- Concurrent execution with AIX Operating System programs
- Shared fixed disk

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[1]   RT, RT PC, and RT Personal Computer are trademarks of IBM

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- Shared main memory or dedicated IBM Personal Computer AT 512KB Memory Expansion Option (optional)

- Support for IBM Personal Computer AT Math Co-Processor (optional)

- Mapping of the IBM Personal Computer display to the IBM RT PC system display.

Specified Operating Environment

Machine Requirements

The minimum machine requirements are:

- An IBM RT PC with

  - 2MB of memory, or

  - 1MB of memory and the IBM Personal Computer AT 512KB Memory Expansion Option (6450203).

  and a display (for example, the IBM RT PC Advanced Color Graphics Display, IBM RT PC Advanced Monochrome Graphics Display, the IBM Personal Computer Display, or equivalent display).

- An IBM RT PC Personal Computer AT Coprocessor Option.

Note: The number of users on the IBM RT PC AIX Operating System Licensed Program, Version 1.1, (74X9995), the number and type of tasks, and the application requirements may expand the system requirements beyond these minimums.

Programming Requirements

The IBM RT PC AIX Operating System Licensed Program, Version 1.1, (74X9995) is a prerequisite for program execution.

Statement of Service

Program service for valid program-related defects in the IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1, is available to all IBM RT PC Personal Computer AT Coprocessor Services Licensed Program, Version 1.1, licensees until February 1, 1988, or until six months after written notice by IBM that the warranty period has been terminated, whichever is sooner. However, service will be provided only for the current update level and for the prior release for ninety (90) days following release of the current level of update.

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- The IBM North-Central Marketing Division or the IBM South-West Marketing Division.

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Following the discontinuance of all program services, this program will be distributed on an "As Is" basis without warranty of any kind either express or implied.
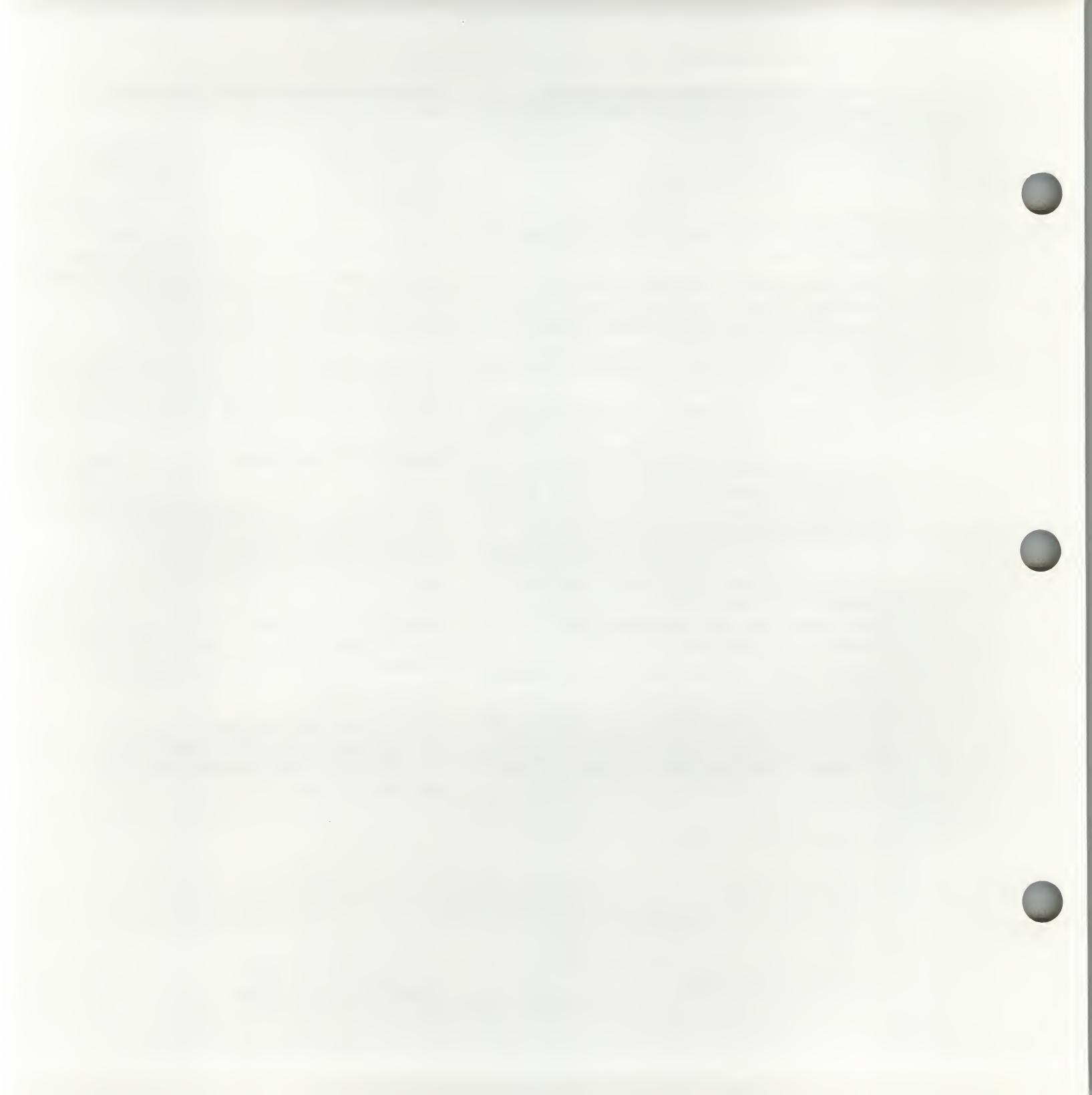
Personal Computer AT Coprocessor Services User's Guide

IBM

**Personal
Computer
Software**

Second Edition, September 1986

About This Book

The IBM RT[1] PC Personal Computer AT Coprocessor Services licensed program allows you to use the IBM RT PC[1] Personal Computer AT Coprocessor Option with the IBM RT Personal Computer[1] system.

This book provides information to help you install, set up, and use the Personal Computer AT Coprocessor Services program.

Who Should Read This Book

If you install or customize the RT PC Personal Computer AT Coprocessor Services program, you need this book. You may also need it to help start, run, and end the Personal Computer AT Coprocessor Services program.

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[1]   Trademark of IBM.

Installation Prerequisites

Before using the RT PC Personal Computer AT Coprocessor
Services program, you must install:

- IBM RT PC AIX Operating System program

  Refer to *IBM RT PC Installing and Customizing the AIX
  Operating System* to help you install the AIX Operating System.

- IBM RT PC Personal Computer AT Coprocessor Option

  Refer to *IBM RT PC User Setup Guide* to install the IBM RT
  PC Personal Computer AT Coprocessor Option.

How to Read This Book

Use the information provided in Appendix A, "Installing the
Personal Computer AT Coprocessor Services licensed program" on
page A-1, to install the Personal Computer AT Coprocessor
Services program.

Read Chapter 1, "Introduction" on page 1-1, for a description of
the Coprocessor and the requirements for using it.

Read Chapter 2, "Getting Started" on page 2-1, when you use the
Coprocessor for the first time.

Read Chapter 3, "The pcstart Command" on page 3-1, for in-depth
information about choosing different options and devices to use
with the Coprocessor.

See Appendix B, "Keyboards" on page B-1 for the differences
between the IBM RT PC keyboard and the IBM Personal Computer
AT keyboard.

See Appendix C, "Coprocessor Messages" on page C-1, if you need information about a particular error message.

A Reader's Comment Form and Book Evaluation Form are provided at the back of this book. Use the Reader's Comment Form at any time to give IBM information that may improve the book. After you become familiar with the book, use the Book Evaluation Form to give IBM specific feedback about the book.

How to Use Each Chapter

In some chapters, you see steps enclosed in a box. If you are familiar with the system, or if you are an experienced system user, use the steps within a box for a specific task. Use the steps within a box whenever you need a quick overview of steps.

If you are not familiar with the system, or if you are not an experienced system user, you may need to read the more detailed information on the pages following a box. Read the pages following a box any time you need more detailed information.

Instructions that tell you to press two or more keys, separated by hyphens, indicate that the keys should be pressed down at the same time. For example, if the instructions say, "Press the **Ctrl-Alt-Action** keys," you should press the **Ctrl** key, the **Alt** key, and the **Action** key. Do not release the keys until all three are pressed.

Variable information is shown in italics. For example, when the system prompts "Allocate (*device*)?" a device name, such as fd0, will appear on the screen for *device*. Information that is exactly what appears on the screen is shown in color. Commands are shown in bold.

The AIX Operating System is case-sensitive. That is, the AIX Operating System commands should be entered with the capitalization as it is shown in this book. Most of the AIX Operating System commands are all lowercase.

What You Need to Know

Because the Personal Computer AT Coprocessor Services program runs on the IBM RT PC system, you need to be familiar with the AIX Operating System.

Throughout this book, the IBM RT PC Personal Computer AT Coprocessor Option and the Personal Computer AT Coprocessor Services are often discussed together. When discussing the feature in a general way, as a combination of the two, it is often referred to as the Coprocessor. When it is significant to discuss the program itself or the hardware option itself, a clear distinction is made.

This book assumes that the Coprocessor will use the IBM Personal Computer Disk Operating System (DOS) used with the IBM Personal Computer AT. In this book, it is called **DOS**. To use the information in this book as it is written, you need to be familiar with DOS. If using some other operating system, some of the information in this book may not apply to you.

This book is not a substitute for specific program documentation. Each program may have specific device requirements. Because you allocate devices when starting the Coprocessor, you need to know the device requirements for each program you plan to use.

This book helps you use the Coprocessor, but it is not a substitute for Personal Computer AT documentation. If you need to do in-depth program writing, or are modifying the system, you may need some information provided in other books. To read about some of these books, refer to "Related Information" on page vii.

Related Information

You may want to refer to some of the following books when using the IBM RT PC Personal Computer AT Coprocessor Services:

- *IBM RT PC User Setup Guide* provides instructions for setting up and connecting devices to the system units. This book also gives procedures for testing the setup and for installing the AIX Operating System. (*Packaged with IBM RT PC Options Installation*)

- *IBM RT PC Personal Computer AT Coprocessor Technical Reference* describes differences between writing applications for the IBM Personal Computer AT and IBM RT PC Personal Computer AT Coprocessor Services. This book also includes Personal Computer AT Coprocessor Services BIOS listing, hardware technical information, Math Coprocessor information, and the 286 and 287 instruction set. (Available optionally)

- *IBM RT PC Options Installation* provides instructions for installing optional adapters in IBM 6151 and IBM 6150 and installing fixed-disk and diskette drives in IBM 6150. (Packaged with *IBM RT PC User Setup Guide*)

- *IBM RT PC Hardware Technical Reference* is a two-volume set. Volume I describes how the system unit operates, including I/O interfaces, serial ports, memory interfaces, and CPU interface instructions. Volume II describes adapter interfaces for optional devices and communications and includes information about IBM Personal Computer family options and the adapters supported by Model 10, Model 20, and Model 25. (Available optionally)

- *IBM RT PC Keyboard Description and Character Reference* describes the national character and keyboard support for the 101-key, 102-key, and 106-key keyboards, including keyboard position codes, keyboard states, control code points, code sequence processing, and nonspacing character sequences.

- *IBM RT PC Installing and Customizing the AIX Operating System* provides step-by-step instructions for installing and

customizing the AIX Operating System, including how to add or delete devices from the system and how to define device characteristics. This book also explains how to create, delete, or change AIX and non-AIX minidisks.

- *IBM RT PC Using and Managing the AIX Operating System* describes using AIX Operating System commands, working with the file system, and developing shell procedures. This book also provides instructions for performing such system management tasks as adding and deleting user IDs, creating and mounting file systems, backing up the system, and repairing file system damage.

- *IBM Personal Computer Disk Operating System 3.1, DOS Reference* contains detailed information about DOS commands.

- *IBM Personal Computer BASIC* tells how to use BASIC. BASIC is provided as a part of the IBM RT PC Personal Computer AT Coprocessor Services.

Ordering Additional Copies of This Book

To order additional copies of this publication (without program diskettes), use either of the following sources:

- To order from your IBM representative, use Order Number SV21-8028.

- To order from your IBM dealer, use Part Number 74X9981.

A binder is included with the order.

Contents

Chapter 1. Introduction

CONTENTS

About This Chapter

This chapter describes the Personal Computer AT Coprocessor
Services and how it works with the IBM RT PC system. It includes
general information about compatibility requirements and an
explanation of the customization profile. It also contains
information about backing up data.

Description

The IBM RT PC system uses the 032 Microprocessor. The Personal Computer AT Coprocessor Option contains the same processor used on the IBM Personal Computer AT. Running the Personal Computer AT Coprocessor Services program allows you to use the Coprocessor to run many Personal Computer AT programs.

You can run programs on the Coprocessor at the same time you run programs on the 032 Microprocessor. The Coprocessor can share a device with the system or use it as a dedicated device, depending on the characteristics of the particular device. Some Personal Computer AT devices that have no equivalent on the system can be emulated.

To run the Coprocessor you need:

- An IBM RT PC system with a display and a keyboard

- To have installed the AIX Operating System

- To use the **devices** command to identify, to the Virtual Resource Manager, all of the devices used by the programs you plan to run

- Use of the system console

- Programs that run on the Personal Computer AT.

Compatibility Requirements

The following list shows some general compatibility requirements:

- Timing-dependent programs may not run correctly on the Coprocessor.

- Programs that require direct access to a fixed disk (or that do not go through BIOS) do not run on the Coprocessor.

- Some of the Personal Computer AT display commands may not be supported on each system display.

Customization Profile

Values for the Coprocessor are stored in a *customization profile*. These values indicate such things as how much memory the Coprocessor uses, what kinds of display it uses, and which devices are assigned (allocated) to it. For more information about the values in the customization profile, see Chapter 3, "The pcstart Command" on page 3-1.

Depending on which programs you plan to run, either on your system or on the Coprocessor, you may want to change some of the values in the customization profile. For example, if a program for the Personal Computer AT requires the use of a color display, choose to emulate the PC Color Display.

You can change the Coprocessor customization profile using the **pcstart** command with prompts, as discussed in "Starting the Coprocessor with Prompts" on page 3-4.

Backing Up Data

Before beginning your work with the Personal Computer AT Coprocessor Services licensed program, make copies of the original diskettes. Use the copies to install the program, and store the original diskettes in a safe place.

If a copy becomes unusable, make a new one. You need to have backup copies available at all times in case your working copies are lost or damaged. Implement your own security and backup procedures to help minimize losses.

Chapter 2. Getting Started

CONTENTS

About This Chapter

This chapter provides initial customization procedures for the Personal Computer AT Coprocessor Services so that DOS loads from a minidisk each time you start it. It also describes starting and stopping the Coprocessor.

For the steps to use when starting the Coprocessor after the initial customization procedures are implemented, see "After Customization" on page 2-10.

Before You Begin

After the Personal Computer AT Coprocessor Services licensed program is installed (see Appendix A, "Installing the Personal Computer AT Coprocessor Services licensed program" on page A-1), you can customize it.

Customizing

The next section of this chapter describes customizing the Coprocessor so that DOS loads each time you use the **pcstart** command.

To follow these procedures easily, you need to know:

- Which devices are available with your system

- Which devices are needed to run your programs

- How to use the AIX Operating System **devices** and **minidisks** commands

- How to use the DOS **FDISK**, **FORMAT**, and **COPY** commands.

If someone has already customized the Coprocessor using the initial customization procedures, you should be able to use the **pcstart** command to start running DOS.

For the steps to use when starting the Coprocessor after the initial customization procedures are implemented, see "After Customization" on page 2-10.

Initial Customization Procedures

The initial customization procedures guide you through the following tasks:

- Creating a Coprocessor minidisk

- Using the **pcstart** command with prompts to verify values and to create a customization profile

- Preparing a minidisk for use by DOS and copying DOS onto the minidisk

- Stopping the Coprocessor

- Revising the customization profile:

    - to allocate a diskette drive to the Coprocessor
    - to bypass prompting
    - to load DOS each time you use the **pcstart** command.

Initial Customization Procedures

1. Enter the **minidisks** command to create a minidisk for the Coprocessor. Write down its name.

2. Insert the DOS diskette in the diskette drive, and enter: `pcstart -p`. Prompting begins:

   a. Press the **Enter** key to accept each default value until you see the prompt `Allocate minidisk to drive C?`. Verify that the value is y, and press the **Enter** key.
   b. After the next prompt, `Which minidisk?`, verify that the value is the name of the minidisk created in Step 1. Press the **Enter** key.
   c. Continue to press the **Enter** key to accept each default value until you see the prompt `Allocate (fd0)?`. Then enter y.
   d. Continue pressing the **Enter** key after each prompt. When you see the prompt, `Update the customization profile?`, enter y.
   e. Verify that the value for the prompt `Start the Coprocessor?` is y, and press the **Enter** key.
   f. The Coprocessor should start running.

3. When the Coprocessor is running and DOS has loaded from the diskette drive, install DOS on the minidisk:

   a. Use the DOS **FDISK** command to create a DOS partition on drive C.
   b. Use the DOS **FORMAT** command to prepare the DOS file system on drive C.
   c. Copy the files from the DOS diskettes to drive C.
   d. Remove the DOS diskette from the diskette drive.

4. To stop the Coprocessor, press the **Ctrl-Alt-Action** keys.

5. Type: `pcstart -np -s,` and press the **Enter** key. At the DOS prompt, `C>`, you can load and run programs.

Additional Information

Read the following pages for more information about the steps on the preceding page.

1. The **minidisks** command shows instructions on the display screen. Use this additional information to follow those instructions:

   - A *fixed disk* is a flat, circular plate on which data can be stored by magnetic recording. The fixed disk is a piece of hardware, and each system has at least one fixed disk inside it.

     Your system may have more than one fixed disk. If it does, you can choose which fixed disk to use for a Coprocessor minidisk.

     Fixed-disk names consist of the letters **hdisk** followed by a single-digit number.

   - A *minidisk* is a division of a fixed disk created by the AIX Operating System. There can be several minidisks on one fixed disk, depending on the minidisk sizes. Minidisk names consist of the letters **hd** followed by a number.

   - A Coprocessor minidisk should *not* have an AIX Operating System file system on it.

   - A minidisk must contain at least 1300 512-byte blocks for DOS. If you want to store other programs or data on the minidisk, it needs to be larger. The maximum size depends on what is available with your system.

   - For more information about the **minidisks** command, refer to *Installing and Customizing the AIX Operating System.*

2. The **pcstart** prompts help you verify values. Additional information about Step 2 is provided below:

- These steps assume your system has the original values as supplied by IBM.

- The values for the Coprocessor can be saved in the customization profile.

- The fd0 device is a diskette drive. Diskette-drive names consist of the letters **fd** followed by a single-digit number (usually 0 or 1).

- If your system has more than one diskette drive, and you allocate one of them to the Coprocessor, they are all allocated to the Coprocessor and are unavailable to the system while the Coprocessor is running.

- Press **Break** (the **Ctrl-Pause** keys) to stop receiving prompts and end the **pcstart** command.

- You can choose to run the Coprocessor or not to run it. If you are using the **pcstart** command only to revise or review the customization profile, you may not want to run the Coprocessor.

- For more information about Coprocessor prompts, see "Starting the Coprocessor with Prompts" on page 3-4.

3. Prepare the minidisk assigned to drive C like you would prepare a fixed disk on the Personal Computer AT:

- If DOS is the only operating system you will use with the Coprocessor, use the entire minidisk for the DOS partition.

- Make sure that the DOS partition is active.

- When using the DOS **FORMAT** command, enter: `FORMAT C:/S/V`

- The DOS **FORMAT** command shows you a warning that everything on a disk is erased. Since you are using the new

minidisk created in Step 1, you can proceed with the command.

- To copy files from drive A to drive C,
  enter: `COPY A:*.* C:/V`

- You may also copy the DOS Supplemental Programs.

- For more information about DOS commands, see the *IBM Personal Computer Disk Operating System 3.1, DOS Reference.*

4. For more information about ending the Coprocessor, see "Stopping the Coprocessor" on page 2-11.

5. Step 5 revises the customization profile using the **pcstart** command without prompts.

   For more information about the **pcstart** command (both with and without prompts), see Chapter 3, "The pcstart Command" on page 3-1.

After Customization

To run the Coprocessor after the initial customization procedures have been implemented, follow these steps:

> **After Customization**
>
> 1. Enter the **pcstart** command.
>
> 2. The Coprocessor starts and you see C>, the DOS prompt.
>
> 3. Load and run your programs.

Stopping the Coprocessor

You can stop running the Coprocessor at any time by pressing the **Ctrl-Alt-Action** keys. If you are in the AIX Operating System, use the left **Alt** key only.

You may also be able to stop the Coprocessor by using the following steps:

1. Press the **Alt-Action** keys to go to the AIX Operating System.

2. Enter the **pcend** command.

3. The message The Coprocessor has stopped displays.

While running the Coprocessor, you may be able to return to the AIX Operating System by pressing the **Alt-Action** keys, depending on how you use the available displays.

If pressing the **Alt-Action** keys does not return you to the AIX Operating System, you must stop running the Coprocessor (by pressing the **Ctrl-Alt-Action** keys) to return to the AIX Operating System.

Ending the Personal Computer AT Coprocessor Services program returns control of all system resources to the AIX Operating System.

Warning: Do NOT use the **kill** command to stop running the Personal Computer AT Coprocessor Services program.

The Personal Computer AT Coprocessor Services program runs like any other program running under the control of the AIX Operating System. You can cancel it by using the **kill** command. However, unknown to the AIX Operating System, the Coprocessor uses the Virtual Resource Manager to allocate system resources. Stopping and starting the Coprocessor are also Virtual Resource Manager functions unknown to the AIX Operating System. Using the **kill** command may leave some of

the system resources unusable and the Coprocessor running
without supervision.

Note: Pressing the **Ctrl-Alt-Delete** keys resets the Coprocessor
like pressing the **Ctrl-Alt-Del** keys on the IBM Personal Computer
AT.

Chapter 3. The pcstart Command

CONTENTS

IBM RT Personal Computer

Personal Computer AT Coprocessor Services User's Guide

Version 1.01 Changes

This package updates the Personal Computer AT Coprocessor Services to Version 1.01 (which is functionally equivalent to Version 1.1).

It adds support for the following:

- Extended Monochrome Graphics Display, Extended Color Graphics Display, and Advanced Monochrome Graphics Display

- Keyboards for other national character sets.

Update Kit Contents

This kit contains:

Item	*Action*
Version 1.01 book	Replace the Version 1.0 book with the Version 1.01 book.

Personal Computer AT Coprocessor Services User's Guide

IBM
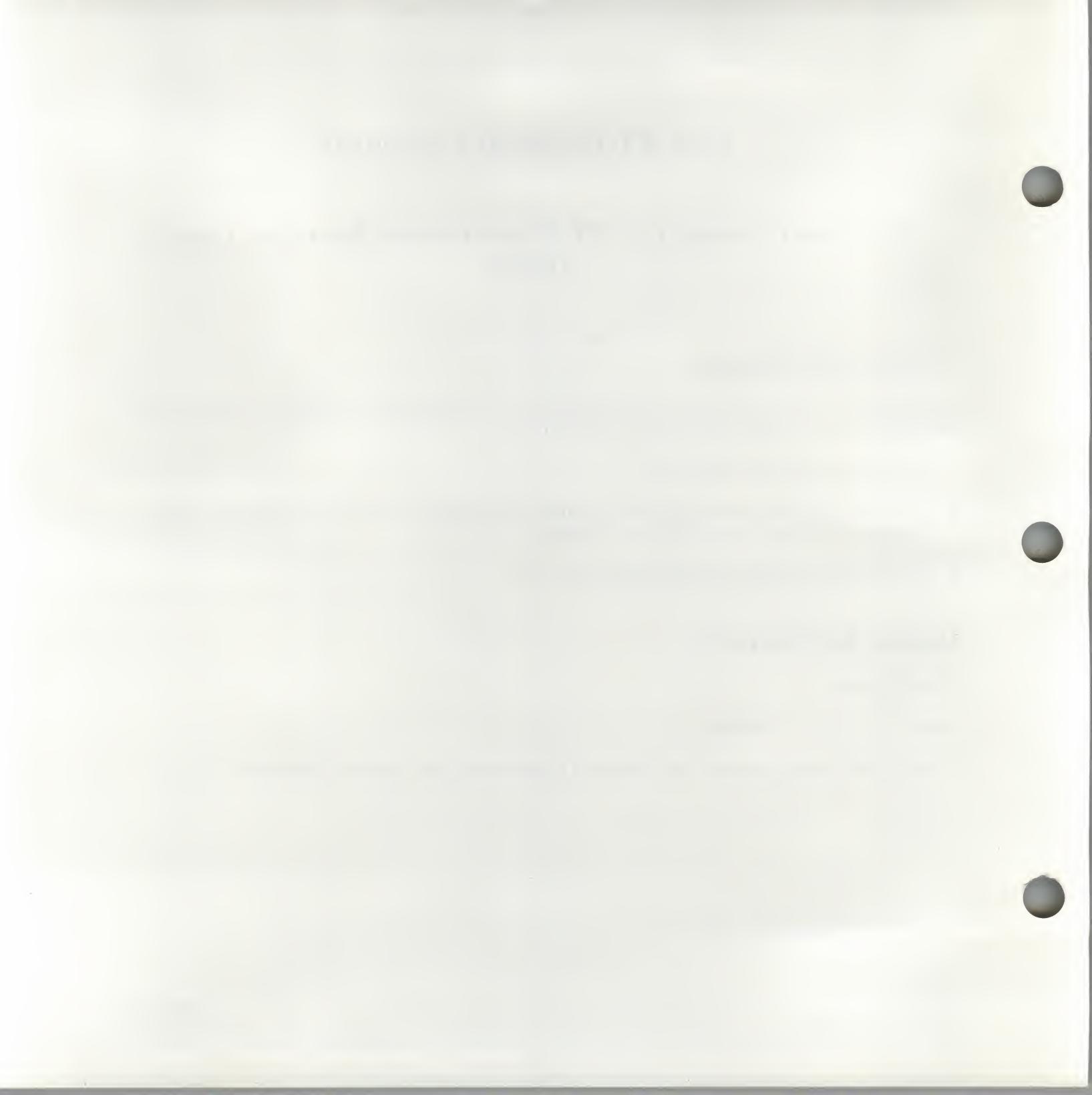
**Personal
Computer
Software**

75X0382

About This Chapter

You can use the **pcstart** command in different ways to start the Personal Computer AT Coprocessor Services.

You can start the Coprocessor by:

- Responding to a series of prompts for the different values in the customization profile

- Entering flags for values in the customization profile on the command line with the **pcstart** command.

The following pages describe starting the Coprocessor with prompts and without prompts.

Starting the Coprocessor with Prompts

When you start the Coprocessor with the **pcstart** command, the system prompts you for each value in the customization profile. These values tell the system which pieces of hardware the Coprocessor uses, and how it uses them.

Following each prompt is the default value. You can accept the default value by pressing the **Enter** key, or you can type a different value before pressing the **Enter** key.

You may want to change the values to run a specific program, or you may need to change the values because of changes to your system.

You can *save* or *not save* the changes you make. The changes you save become part of the new customization profile. Changes you make for a particular program may not be applicable for other programs, and you would not want to save them.

Use the **pcstart** command with prompts any time you want to make changes to the customization profile. Because the current value is shown with each prompt, errors are easier to avoid and detect.

Note: Press **Break** (the **Ctrl-Pause** keys) to stop receiving prompts and end the **pcstart** command.

List of Prompts

All of the prompts for the Coprocessor refer to values in the customization profile. In many cases, which prompts appear and the order in which they appear depend on what is available with your system. For example, if your system does not have an IBM Personal Computer Display, you do not see a prompt for the IBM Personal Computer Display.

The descriptions of these prompts assume that the defaults are the same as those provided to you by IBM.

If you make an invalid response to a prompt, the prompt is repeated.

The prompts can be divided into a few major categories. The categories are:

1. Memory

2. Displays

3. Communications

4. Minidisks

5. Devices.

In addition to these groups, there are two more prompts at the end. These last two prompts allow you to save the values you enter and start running the Coprocessor.

Note: The replies to many of the following prompts are y for **yes** and n for **no**.

Description of Coprocessor Prompts

The prompts are described below:

1. Memory

   Memory size?

   Default value: 256

   Optional value: Any number over 256, in multiples of 32.

   Description: Memory size is specified in units of 1K bytes.
   You can specify any value over 256 if it is available. The
   number must be a multiple of 32. If the AT 512 KB Memory
   Expansion Option is not large enough (or if it is not installed),
   additional memory comes from the system memory.

2. Displays

   The order in which the display prompts appear depends on the
   customization of your system. For instance, if the primary
   system display uses the IBM Personal Computer Enhanced
   Color Display, the prompt for that display appears first.

   The default is y for the first display prompt only and n for any
   others. If a system display has one or more *virtual terminals*
   when dedicated to the Coprocessor, then other system displays
   cannot be shared. You do not see prompts for displays not
   connected to the system.

The display prompts are:

Use IBM Personal Computer Display?

Default value: y

Optional value: n

Description: You can use the IBM Personal Computer Display with the Coprocessor.

Use IBM Personal Computer Enhanced Color Display?

Default value: y

Optional value: n

Description: You can use the IBM Personal Computer Enhanced Color Display with the Coprocessor.

Use IBM Advanced Monochrome Graphics Display?

Default value: y

Optional value: n

Description: You can use the Advanced Monochrome Graphics Display with the Coprocessor.

Use IBM Advanced Color Graphics Display?

Default value: y

Optional value: n

Description: You can use the Advanced Color Graphics Display with the Coprocessor.

Use IBM Extended Monochrome Graphics Display?

Default value: y

Optional value: n

Description: You can use the Extended Monochrome Graphics Display with the Coprocessor.

Dedicate this display to the Coprocessor?

Default value: n for primary system display

                            y for all other displays

Description: You can elect to *share* the system display with your system, or *dedicate* it to the Coprocessor.

When sharing the display with the system, you can return to the AIX Operating System at any time by pressing the **Alt-Action** keys.

When a system display that is being used by the AIX Operating System is dedicated to the Coprocessor, you must stop the Coprocessor to return to the AIX Operating System by pressing the **Ctrl-Alt-Action** keys.

If the Advanced Monochrome Graphics Display, the Advanced Color Graphics Display, or the Extended Monochrome Graphics

Display is the only display you are using with the Coprocessor, choose **n** for this prompt because it must be shared with the system.

Note: If you are using a display attached to an Enhanced Graphics Adapter, it may start in the 40-character mode. If this happens, issue the **MODE CO80** DOS command or the **MODE MONO** DOS command to restore the normal 80-character mode, and continue with your work.

Use this display as the primary display for the Coprocessor?

Default value: y for the first display

n for all others

Description: If you use more than one display with the Coprocessor, you can choose any one of them to be the primary display. If you use the Advanced Monochrome Graphics Display, the Advanced Color Graphics Display, or the Extended Monochrome Graphics Display and chose **y** for the previous prompt, you do not see this prompt.

Note: When dedicating a display connected to the IBM PC Enhanced Graphics Adapter, the primary Coprocessor display is determined by the switch settings on the adapter, not by the answer to this prompt. For more information about Enhanced Graphics Adapter switch settings, see *Options Installation*.

Emulate the IBM Personal Computer Color Display?

Default value: n

Optional value: y

Description: You can emulate the IBM Personal Computer Color Display on the Advanced Monochrome Graphics Display or the Advanced Color Graphics Display by choosing **y**. If you choose **y**, then you cannot also use the IBM Personal Computer Enhanced Color Display.

3. Communications

Redirect communications ports to serial ports for printers, communications, networks, and other applications. Redirection allows you to emulate the serial port functions of the Personal Computer AT Serial/Parallel Adapter on either serial port. The Model 10 does not show prompts for communications.

Note: When you assign one serial port to the Coprocessor (by redirecting output from a Coprocessor communications port to that serial port), then both serial ports are allocated to the Coprocessor, and are unavailable to the system while the Coprocessor is running.

The communications prompts are:

Redirect primary communications port?

Default value: n

Optional value: y

Description: You can redirect output from the Coprocessor primary communications port to either serial port.

To serial port 1?

Default value: y

Optional value: n

Description: You can redirect output from the Coprocessor primary communications port to either serial port. If you choose **n**, output is redirected to serial port 2.

Redirect secondary communications port?

Default value: n

Optional value: y

Description: You can redirect the Coprocessor secondary communications port to either serial port.

To serial port 1?

Default value: y

Optional value: n

Description: You can redirect output from the Coprocessor primary communications port to either serial port. If you choose **n**, output is redirected to serial port 2. If you choose to redirect both the primary and secondary communications ports, this prompt does not display twice, and the Coprocessor secondary communications port is automatically redirected to the available serial port.

4. Minidisks

The Coprocessor does not directly access a fixed disk.
However, you can assign up to two minidisks to the
Coprocessor.

Use the **minidisks** command to create a minidisk for the
Coprocessor. Refer to *Installing and Customizing the AIX
Operating System* for information about the **minidisks**
command.

The prompts for minidisks are:

Allocate minidisk to disk drive C?

Default value: y (if at least one Coprocessor minidisk exists),
or n

Optional value: y, n

Description: You can create a minidisk and assign it to
drive C. You must assign a minidisk to drive C before
assigning one to drive D.

Which minidisk?

Default value: name of the first Coprocessor minidisk
created (if it exists), or none

Optional value: Any valid minidisk

Description: You can choose any valid minidisk for drive C.

Allocate minidisk to disk drive D?

Default value: y (if at least two Coprocessor minidisks exist), or n

Optional value: y, n

Description: You can create minidisks and assign them to both drive C and drive D. You must assign a minidisk to drive C before assigning one to drive D.

Which minidisk?

Default value: name of the second Coprocessor minidisk created (if it exists), or none

Optional value: Any valid minidisk

Description: You can choose any valid minidisk for drive D (except the one currently allocated to drive C).

5. Devices

   You can allocate or unallocate (override the value listed in the customization profile) any of the available devices. You can also specify how the Coprocessor deals with attempts to use unallocated devices.

   Before entering the **pcstart** command, use the **devices** command to make all of the devices used by the programs you plan to run available to the Coprocessor. For more information about the **devices** command, refer to *Installing and Customizing the AIX Operating System.* You can also use the **devices** command to identify Coprocessor–only devices. These devices may include some not otherwise available with your system. For more information about Coprocessor–only devices, see *Personal Computer AT Coprocessor Technical Reference.*

The prompts for devices are:

Allocate (*device name*)?

Default value: n

Optional values: y, x

Description: You can use or not use any of the devices available to the Coprocessor that have been added using the **devices** command. For example, you can choose to use or not to use fd0, a diskette drive.

Notes:

a. When you allocate one diskette drive to the Coprocessor, both diskette drives (if your system has more than one) are allocated to the Coprocessor, and are unavailable to the system while the Coprocessor is running.

b. Choose **x** to stop the prompting for device values.

Display warning on access to unallocated devices?

Default value: n

Optional value: y

Description: The program you plan to run may try to use device addresses that are not available to the Coprocessor. You can choose to see a warning message, generated and displayed by the AIX Operating System, when this occurs. The program may or may not continue running on the Coprocessor.

You must choose **n** to answer this prompt in order for some programs to run. For example, the IBM PC Storyboard program continually checks for a joystick or mouse and will not run unless you choose **n**.

In addition to these groups, there are two more prompts at the end. These last two prompts allow you to save the values you enter and start running the Coprocessor. These prompts are:

Update the customization profile?

Default value: n

Optional value: y

Description: You can save the changes you make using the **pcstart** command. Choosing **y** causes the new customization profile to be saved in the current directory as **pcprofile**.

You can also change the values any time you start the Coprocessor without changing the default values. If you are changing the values for a particular program, you may not want to save the changes. By starting the Coprocessor from different directories, you can use different customization profiles.

Start the Coprocessor?

Default value: y

Optional value: n

Description: You may use the **pcstart** command to verify the values in the customization profile, or to change values. You do not have to run the Coprocessor to verify or change profile values.

Note: Press **Break** (the **Ctrl-Pause** keys) to stop receiving prompts and end the **pcstart** command. You cannot use **Break** to stop the Coprocessor after the final prompt.

Starting the Coprocessor without Prompts

You can include optional values, known as flags, on the command line when you use the **pcstart** command. To do this, type the flags along with the **pcstart** command.

You see prompts for flags you do not enter unless you also include **-np** (for *no prompt*).

The flags can be divided into a few major categories. The categories are:

1. Memory

2. Displays

3. Communications

4. Minidisks

5. Devices.

In addition, there are three other groups of flags. These flags determine if prompting occurs, if the changes you make are saved, and if the Coprocessor runs.

Read the following pages for more information about the flags.

Description of Flags

In the following description of the flags, note that **-n** preceding a value means *no*. Conflicting flags are ignored. Incorrect flags may cause the **pcstart** command to start prompting.

1. Memory

   If you do not use this flag, the value defined in the customization profile remains in effect. The memory flags are:

   -k256 Use 256K bytes of memory. This is the default value provided by IBM.

   -k*number* You can choose any number over 256 in multiples of 32. If the AT 512 KB Memory Expansion Option is not large enough (or is not installed), the Coprocessor uses system memory.

2. Displays

   Which flags are available depends on your system. For instance, you cannot use flags for displays not connected to the system.

   Also, using some values prevents the use of others:

   - Only one system display can be shared.

   - Only one system display can be designated the primary display.

   - When emulating the IBM Personal Computer Color Display on the Advanced Monochrome Graphics Display or the Advanced Color Graphics Display, you cannot also use the IBM Personal Computer Enhanced Color Display.

- When emulating the IBM Personal Computer Display on the Advanced Monochrome Graphics Display, the Advanced Color Graphics Display, or the Extended Monochrome Graphics Display, you cannot also use the IBM Personal Computer Display.

- If the primary system display is dedicated to the Coprocessor, other displays cannot be shared.

- If you want to use more than one system display, only one of them can be used by the AIX Operating System.

- If the only displays you are using with the Coprocessor are any combination of the Advanced Monochrome Graphics Display, the Advanced Color Graphics Display, or the Extended Monochrome Graphics Display, you cannot dedicate all of them to the Coprocessor.

  - If the Advanced Monochrome Graphics Display is the only display you are using with the Coprocessor, do *not* use the **-gd** flag.

  - If the Advanced Color Graphics Display is the only display you are using with the Coprocessor, do *not* use the **-hd** flag.

  - If the Extended Monochrome Graphics Display is the only display you are using with the Coprocessor, do *not* use the **-xd** flag.

The flags for displays are:

-nm   Do not use the IBM Personal Computer Display.

-md   Use the IBM Personal Computer Display, and dedicate it to the Coprocessor.

-mD   Use the IBM Personal Computer Display, and dedicate it to the Coprocessor as the primary display.

-ms   Use the IBM Personal Computer Display, and share it with the system.

-mS   Use the IBM Personal Computer Display, and share it with the system as the primary Coprocessor display.

-ne   Do not use the IBM Personal Computer Enhanced Color Display.

-ed   Use the IBM Personal Computer Enhanced Color Display, and dedicate it to the Coprocessor.

-eD   Use the IBM Personal Computer Enhanced Color Display, and dedicate it to the Coprocessor as the primary display.

-es   Use the IBM Personal Computer Enhanced Color Display, and share it with the system.

-eS   Use the IBM Personal Computer Enhanced Color Display, and share it with the system as the primary Coprocessor display.

-ng   Do not use the Advanced Monochrome Graphics Display.

-gd   Use the Advanced Monochrome Graphics Display, and dedicate it to the Coprocessor.

-gm   Use the Advanced Monochrome Graphics Display to emulate the IBM Personal Computer Display, and share it with the system.

-gM   Use the Advanced Monochrome Graphics Display to emulate the IBM Personal Computer Display, and share it with the system as the primary Coprocessor display.

-gc   Use the Advanced Monochrome Graphics Display to emulate the IBM Personal Computer Color Display, and share it with the system.

-gC   Use the Advanced Monochrome Graphics Display to emulate the IBM Personal Computer Color Display, and share it with the system as the primary Coprocessor display.

-nh   Do not use the Advanced Color Graphics Display.

-hd   Use the Advanced Color Graphics Display, and dedicate it to the Coprocessor.

-hm   Use the Advanced Color Graphics Display to emulate the IBM Personal Computer Display, and share it with the system.

-hM   Use the Advanced Color Graphics Display to emulate the IBM Personal Computer Display, and share it with the system as the primary Coprocessor display.

-hc   Use the Advanced Color Graphics Display to emulate the IBM Personal Computer Color Display, and share it with the system.

-hC   Use the Advanced Color Graphics Display to emulate the IBM Personal Computer Color Display, and share it with the system as the primary Coprocessor display.

-nx   Do not use the Extended Monochrome Graphics Display.

-xd   Use the Extended Monochrome Graphics Display, and dedicate it to the Coprocessor.

-xm   Use the Extended Monochrome Graphics Display to emulate the IBM Personal Computer Display, and share it with the system.

-xM   Use the Extended Monochrome Graphics Display to emulate the IBM Personal Computer Display, and share it with the system as the primary Coprocessor display.

3. Communications

Redirect communications ports for printers, communications, networks, and other applications. Communications ports cannot be redirected on the Model 10.

Note: When you assign one serial port to the Coprocessor (by redirecting output from a Coprocessor communications port to that serial port), then both serial ports are allocated to the Coprocessor, and are unavailable to the system while the Coprocessor is running.

The flags for communications are:

-n1   Do not redirect the Coprocessor primary communications port.

-11, -12   You can redirect the Coprocessor primary communications port to either serial port.

-n2   Do not redirect the Coprocessor secondary communications port.

-21, -22   You can redirect the Coprocessor secondary communications port to either serial port.

    Note: You cannot redirect both Coprocessor communications ports to the same serial port.

4. Minidisks

   The Coprocessor does not directly access a fixed disk. However, you can assign up to two minidisks to the Coprocessor.

   For more information about the **minidisks** command, see *Installing and Customizing the AIX Operating System*. The flags for minidisks are:

   -nc   Do not assign a minidisk to drive C.

   -c*minidisk*   You can choose **-c** and follow it with any valid minidisk.

   -nd   Do not assign a minidisk to drive D.

   -d*minidisk*   Before you can assign a minidisk to drive D, you must first assign a minidisk to drive C. To assign a minidisk to drive D, type **-d** and follow it with any valid minidisk.

5. Devices

   You can allocate or unallocate (override the value listed in the customization profile) any of the devices available to the Coprocessor. You can also specify how the Coprocessor deals with attempts to use unallocated devices.

   Before entering the **pcstart** command, use the **devices** command to make all of the devices used by the programs you plan to run available to the Coprocessor. For more information about the **devices** command, refer to *Installing and Customizing the AIX Operating System*. For more information about Coprocessor – only devices, see *Personal Computer AT Coprocessor Technical Reference*.

   The flags for devices are:

-a*device*   Allocate a device. Type the device name after **-a**. For example, to allocate a diskette drive, choose **-afd0**.

Note: When you allocate one diskette drive to the Coprocessor, all diskette drives (if your system has more than one) are allocated to the Coprocessor, and are unavailable to the system while the Coprocessor is running.

-u*device*   Do not allocate a device that would be allocated when using the customization profile. Type the device name after the **-u**.

-nw   If you choose **-nw**, warning messages are not generated or displayed by the AIX Operating System when a program tries to use device addresses not available to the Coprocessor.

You must choose **-nw** in order for some programs to run. For example, the IBM PC Storyboard program continually checks for a joystick or mouse and will not run unless you choose **-nw**.

-w   Give a warning message, generated and displayed by the AIX Operating System, when a program running on the Coprocessor tries to used device addresses not available to the Coprocessor.

In addition, there are three other groups of flags. These flags determine if prompting occurs, if the changes you make are saved, and if the Coprocessor runs.

The additional flags are:

-p   Prompt for each parameter, and give the current value. For more information, see "Starting the Coprocessor with Prompts" on page 3-4.

-np   When you choose **-np**, and a customization profile has already been created you do not see any prompts. For more information about the customization profile, see "Initial Customization Procedures" on page 2-5. If you do not want to verify, change, or correct any of the values in the customization profile, you may want to start the Coprocessor without any prompts.

-ns   When you choose **-ns**, the Coprocessor uses the changes you make, but it does not use them the next time it is started. This flag changes the customization profile to run a particular program without interfering with the normal customization profile.

-s   Save the changes you make to the customization profile.

-r   Run the Coprocessor.

-nr   When you choose **-nr**, the Coprocessor does not run. While using the **pcstart** command to revise or examine the customization profile, you may not want to run the Coprocessor.

Example of Starting the Coprocessor without Prompts

You can enter most flags in any order. One way you can use the **pcstart** command without prompts is shown below.

Assume that you have an existing customization profile and that your program requires the following:

- 640K of memory

- Emulation of an IBM Personal Computer Color Display (using the Advanced Monochrome Graphics Display)

- Communications with a Personal Computer AT attached to the serial port 1 and a printer attached to the serial port 2 (requires redirection of communications ports)

- A minidisk, hd7.

You could type: `pcstart -np -k640 -gC -11 -22 -chd7`
and press the **Enter** key.

When you see the DOS prompt, C>, you can load and run programs.

Appendix A. Installing the Personal Computer AT Coprocessor Services licensed program

The Personal Computer AT Coprocessor Services allows you to use the Personal Computer AT Coprocessor Option to run many Personal Computer AT programs. This appendix explains how to install the Personal Computer AT Coprocessor Services licensed program. Before installing the Personal Computer AT Coprocessor Services, the AIX Operating System must be installed.

You should make sure that you are the only user on your system while installing the Personal Computer AT Coprocessor Services. If other users are working on the system, installation may fail.

Locate the Diskettes

To install the Personal Computer AT Coprocessor Services program, you need the Personal Computer AT Coprocessor Services licensed program diskette.

Remove the Personal Computer AT Coprocessor Services diskette from the plastic envelope in the back of this binder.

Operating from AIX shell or Usability Services

You must be in AIX shell or Usability Services to install the Personal Computer AT Coprocessor Services. If you are now using AIX shell, go to "Installing the Personal Computer AT Coprocessor Services from the AIX shell."

If you are using Usability Services, you have two choices:

- Turn to the **install** command, described in *Usability Services Reference*. You can enter the **install** command and follow the prompts.

- Go to the WINDOWS window and select AIX from the Window Types pane. Select OPEN from the command bar. Enter the **installp** command and follow the prompts.

Installing the Personal Computer AT Coprocessor Services from the AIX shell

To install the Personal Computer AT Coprocessor Services from the AIX shell, follow the steps on the next page. If an error message occurs during the procedure, see *Messages Reference* for details.

> **To Install this licensed program**
>
> 1. Log in as su.
>
> 2. After the AIX Operating System # prompt, type `installp`. Then press the **Enter** key.
>
> 3. Follow the prompts to insert the Personal Computer AT Coprocessor Services licensed program diskette and install the program.
>
> 4. The operating system restarts.

More Detailed Information

1. Log into the system as su. See *Using and Managing the AIX Operating System* for more information. After logging in, you see the AIX Operating System # prompt.

2. Type `installp` command. Then press the **Enter** key.

   `# installp`

   You see the following prompt:

   ```
   Before you continue, you must make sure there is no other
   activity on the system.  You should have just restarted
   the system, and no other users should be logged on.  Refer
   to your messages reference book for more information.

   Do you want to continue this command (y or n):
   ```

3. See the discussion of message 000-123 in *Messages Reference* for more information. To continue, type y and press the **Enter** key. You see the following prompt:

   ```
   Please mount volume 1 on /dev/rfd0.
      . . .   and type return to continue.
   ```

4. Insert the Coprocessor Services licensed program diskette into the diskette drive, and press the **Enter** key. You see the following prompt:

```
The licensed program "Coprocessor Services"
will be installed.

Do you want to do this? (y/n)
```

5. Type y to continue the installation, and press the **Enter** key.

Warning: As part of the installation procedure, the system restarts. Make sure that you are the only user on your system while you are installing the Personal Computer AT Coprocessor Services. Also, you should not be running any programs or have any open files.

You see the following prompt:

```
You are about to install the
"Coprocessor Services" licensed program.
Successful installation of this LPP will cause your
operating system to be restarted.

Please reply "y" if you wish to
proceed with the installation.  Reply anything else to
cancel the installation of this LPP.
```

6. Type y to continue the installation, and press the **Enter** key. You see the following prompt:

```
Please mount volume 1 on /dev/rfd0.
 . . .  and type return to continue.
```

7. Press the **Enter** key.

Installation will take several minutes.

8. Remove the Personal Computer AT Coprocessor Services licensed program diskette from the diskette drive.

    When installation is complete, you see the following message:

    ```
    The installation process has completed.
    The system will now shut down.  After the
    system has shut down, you may restart it
    by pressing the Ctrl-Alt-Pause keys.

    ....Shutdown completed....
    ```

9. After you press the **Ctrl-Alt-Pause** keys, the operating system reloads.

You can now begin using the Personal Computer AT Coprocessor Services.

Return Codes

If installation fails, you see error message 048-015 directing you to look at a history file (**/usr/lpp/coprocr/lpp.hist**). This history file records the cause of the failure as a return code from 249 to 255. The return codes are defined below:

249   The **/usr/lpp/coprocr/lpp.bios** file initialization failed.

250   Rebuilding kernel failed.

251   Error update failed.

252   Trace update failed.

253   The **restore -x** command failed.

254   Backup of existing files failed.

255   Prerequisite check failed.

Note: The root directory or the **/usr** directory may be too full. The backup copies of the kernel may be too large. You can delete these files using the **rm** command as described in *Commands Reference*. The name of a backup copy of the kernel usually consists of **/unix** followed by the last two digits of the year and the Julian date. For example, **/unix86137** could be the backup copy of the kernel created on May 17, 1986.

Customizing the Coprocessor

To customize the Coprocessor so that DOS loads each time you enter the **pcstart** command, see "Initial Customization Procedures" on page 2-5.

Appendix B. Keyboards

The following pages illustrate and describe the differences between the Personal Computer AT keyboard and the IBM RT PC keyboard.

Look at the top figure to see the Personal Computer AT keyboard, and look at the bottom figure to see the RT PC keyboard. Read the page facing each set of figures for descriptions of the differences between the two keyboards.

If you have a keyboard template for a specific program, compare that template with the information in this appendix before running the program.

Figure   B-1.   Personal Computer AT Keyboard

Figure   B-2.   RT PC Keyboard

All the keys on the Personal Computer AT are on the RT PC
keyboard. However, you may find some of them in different
locations than on the Personal Computer AT keyboard. Some of
the keys also have different names.

Use the following pages to determine which keys are in different
locations on the RT PC keyboard and the Personal Computer AT
keyboard.
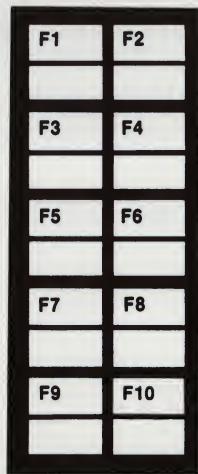
Figure   B-3.   Personal Computer AT Keyboard, Function Keys
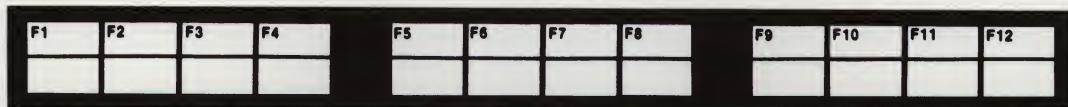
Figure   B-4.   RT PC Keyboard, Function Keys

Find the function keys (F1 — F10) along the top of the RT PC keyboard. Note the two additional function keys (F11 and F12).

Figure B-5. Personal Computer AT Keyboard, Typing Keys

Figure B-6. RT PC Keyboard, Typing Keys

AT Key	RT PC Key	RT PC Location
\ (Backslash) and ¦ (Logical Separator)	\ (Backslash) and ¦ (Logical Separator)	Under the **Backspace** key.
Caps Lock	**Caps Lock**	Left of the **A** key.
Ctrl	**Ctrl**	Below the left **Shift** key, and left of the left **Alt** key and the **Space Bar**.
~ (**Tilde**) and ` (**Grave Accent**)	~ (**Tilde**) and ` (**Grave Accent**)	Left of the number **1** and the **Exclamation Point** key.

Notice the two **Alt** keys, one on each side of the **Space Bar**.
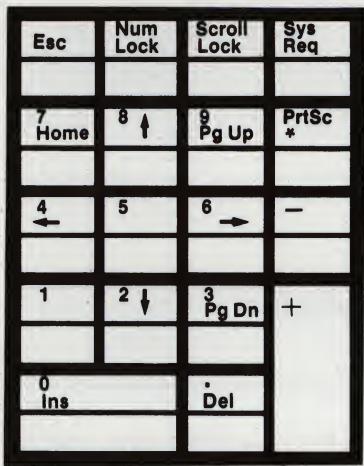
Figure   B-7.   Personal Computer AT Keyboard, Cursor Movement Keys
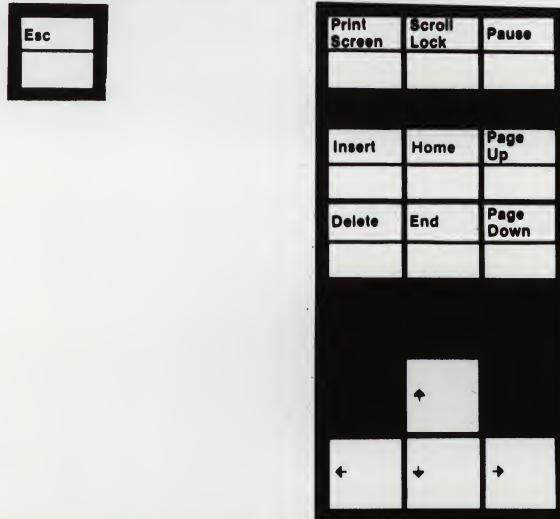
Figure   B-8.   RT PC Keyboard, Cursor Movement Keys

AT Key	RT PC Key	RT PC Location
Esc	Esc	Top left-hand corner of the Keyboard
PrtSc	Print Screen	Right of the **F12** key.
Sys Req	Sys Req	Right of the **F12** key. Press **Ctrl-Print Screen**.
Scroll Lock	Scroll Lock	Right of the **Print Screen** key and the **Sys Req** key.
Ctrl-Num Lock	Pause	Right of the **Scroll Lock** key.
Break	Break	Right of the **Scroll Lock** key. Press **Ctrl-Pause**.
Ins	Insert	Left of the **Home** key.
Home	Home	Between the **Insert** key and the **Page Up** key.
PgUp	Page Up	Right of the **Home** key.
Del	Delete	Left of the **End** key.
End	End	Below the **Home** key.
PgDn	Page Down	Right of the **End** key.

Find the cursor movement keys on a separate keypad, to the left of the numbers.

Warning: If the program running on the Coprocessor requires the use of the **Ctrl-Alt-Pause** keys, use the right **Alt** key or you will reload your system.
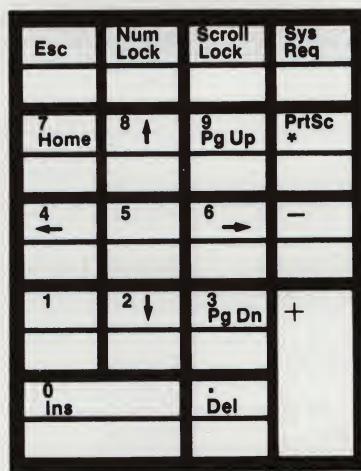
Figure B-9. Personal Computer AT Keyboard, Numeric Keypad
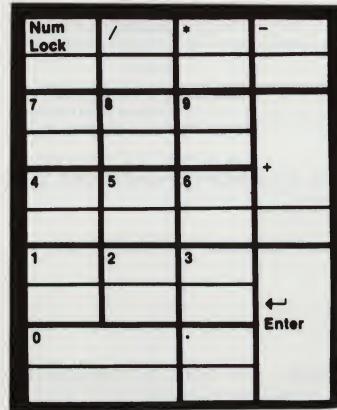
Figure B-10. RT PC Keyboard, Numeric Keypad

Find the **Num Lock** key above the number 7 on the numeric keypad. Find the numeric keypad on separate keys to the right of the cursor movement keys.

Keyboards for Other National Character Sets

In addition to the keyboard used in the United States, IBM provides other keyboards for use in other countries. These keyboards provide other national character sets.

To use one of these keyboards, you must also use the **KEYBxx (Load Keyboard)** DOS command. For more information about the **KEYBxx (Load Keyboard)** DOS command, see *IBM Personal Computer Disk Operating System 3.1, DOS Reference*. You may also need to use a national language support diskette.

The next few pages show some of the Personal Computer AT keyboards and the RT PC keyboards used with other national character sets.

For more information about the RT PC keyboards used with other national character sets, see *Keyboard Description and Character Reference*.

Since the Coprocessor emulates a Personal Computer AT keyboard, use the Personal Computer AT keyboards shown on the following pages to help you find the key you need to use on the RT PC.
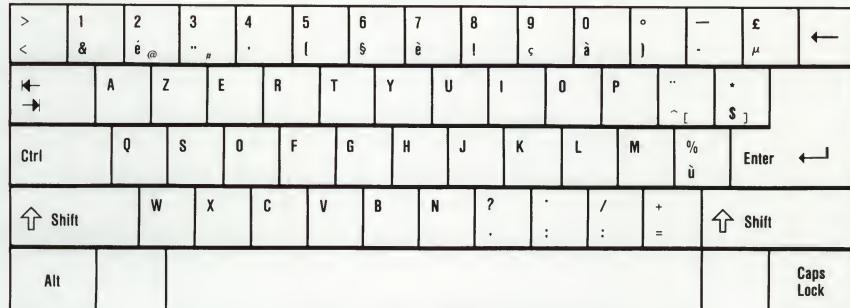
Figure   B-11.   Belgian-French/Dutch Personal Computer AT Keyboard
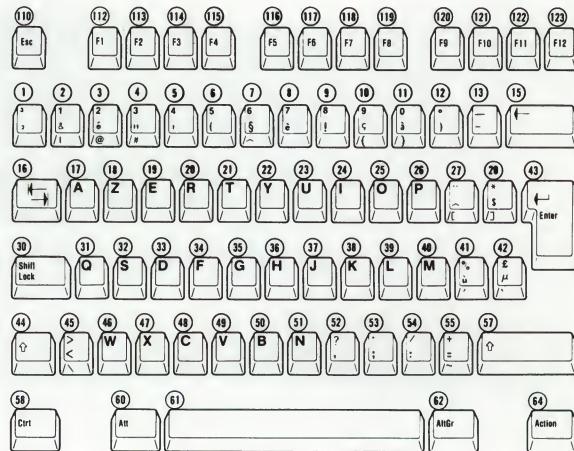
Figure   B-12.   Belgian-French/Dutch RT PC Keyboard
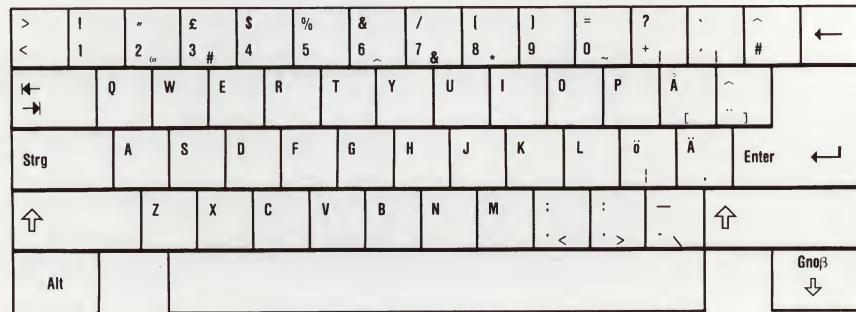
Figure   B-13.   Swedish/Finnish Personal Computer AT Keyboard
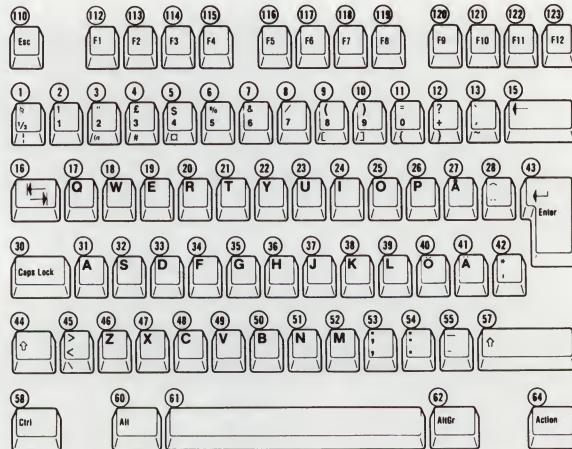
Figure   B-14.   Finnish/Swedish RT PC Keyboard
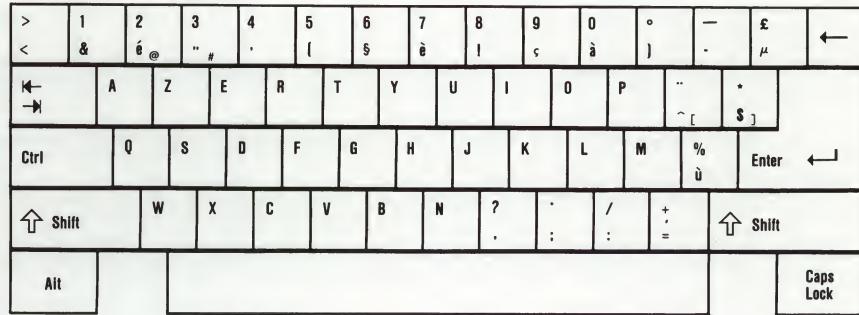
Figure   B-15.   French Personal Computer AT Keyboard
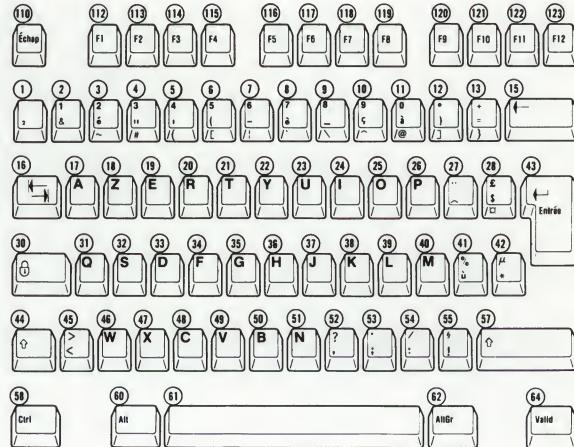
Figure   B-16.   French RT PC Keyboard
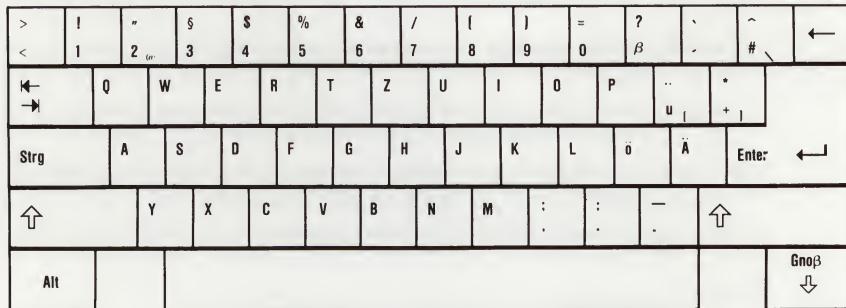
Figure   B-17.   German Personal Computer AT Keyboard
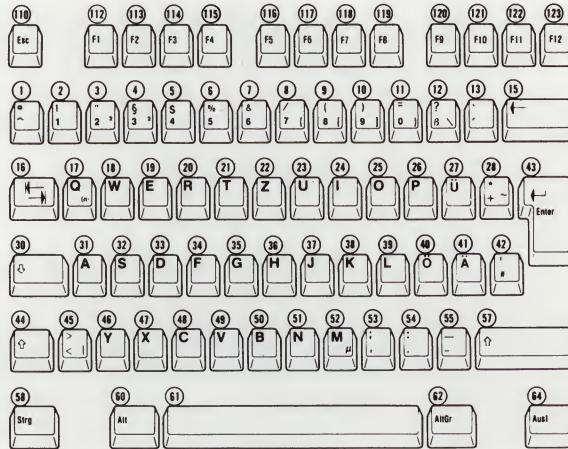
Figure   B-18.   German RT PC Keyboard
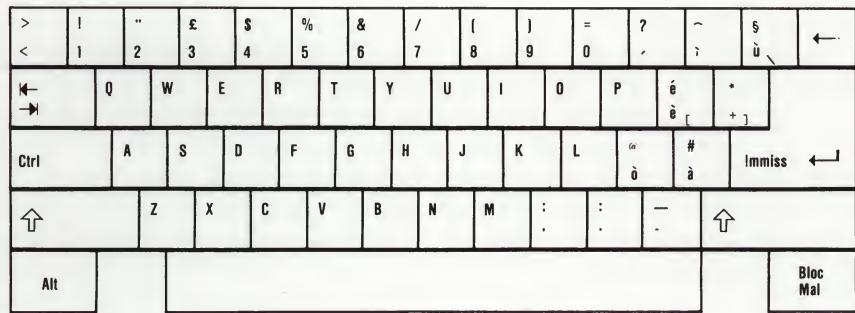
Figure   B-19.   Italian Personal Computer AT Keyboard
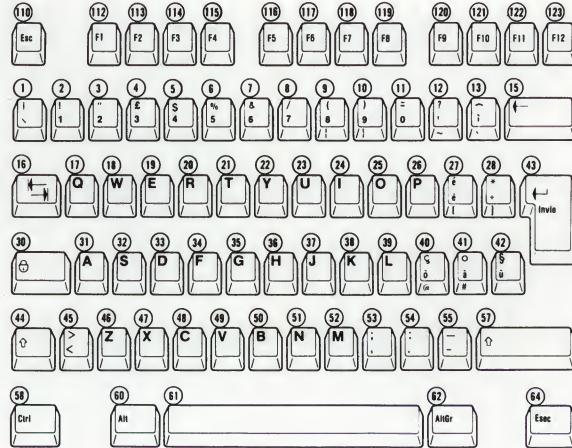
Figure   B-20.   Italian RT PC Keyboard
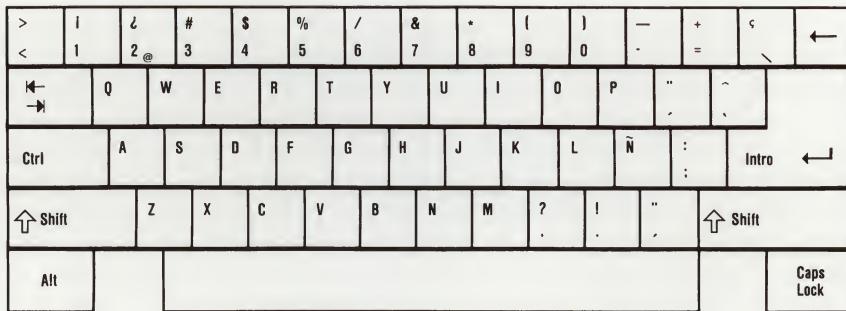
Figure   B-21.   Spanish Personal Computer AT Keyboard
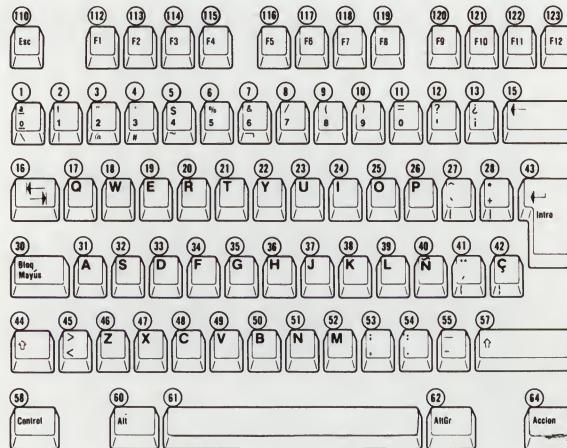
Figure   B-22.   Spanish RT PC Keyboard
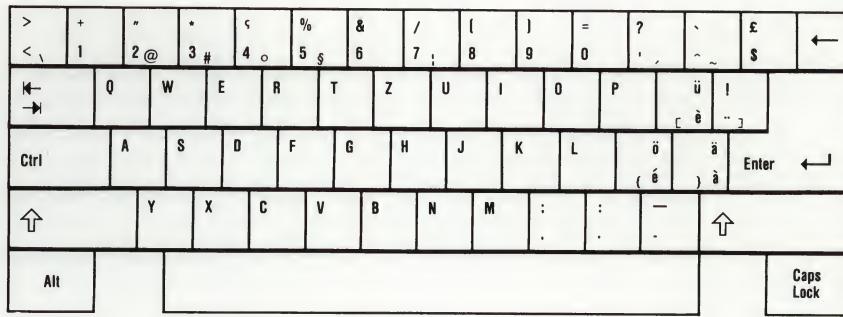
Figure B-23. Swiss/French Personal Computer AT Keyboard
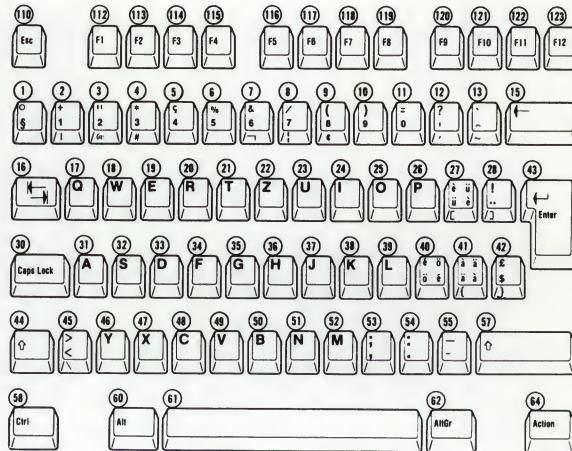
Figure B-24. Swiss/French RT PC Keyboard
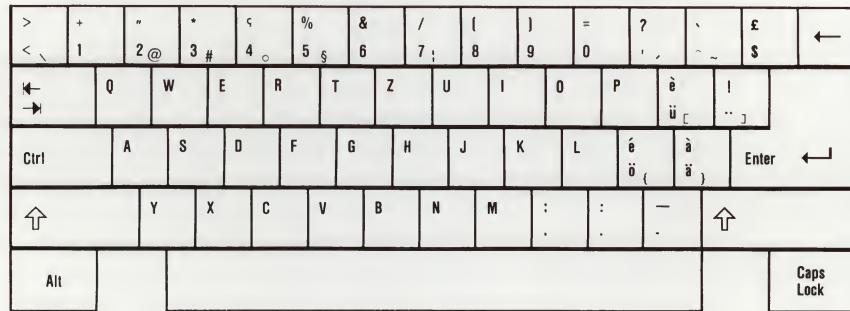
Figure B-25. Swiss/German Personal Computer AT Keyboard
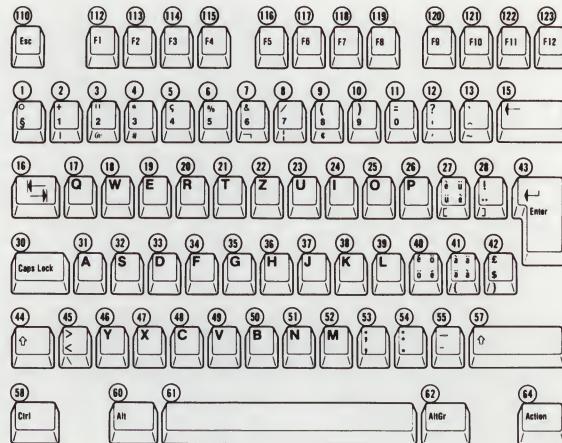
Figure B-26. Swiss/German RT PC Keyboard

Figure B-27. U. K. English Personal Computer AT Keyboard
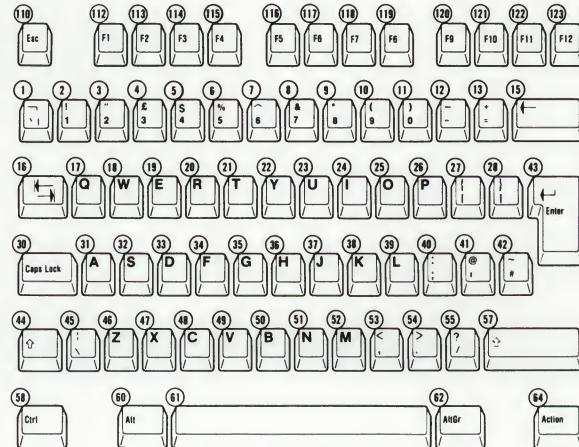
Figure B-28. U. K. English RT PC Keyboard

Appendix C. Coprocessor Messages

023-001   **The system will now prompt you for missing customization values. Press Enter to accept the displayed default value, or type a different value and press Enter.**

Cause: You see this message when using the **pcstart** command with prompts, or if you enter a value that is not valid when using the **pcstart** command without prompts.

Action: Press the **Enter** key to accept the default value following each prompt, or type a different value and press the **Enter** key.

023-002   **You entered a memory size that is less than 256 or is not a multiple of 32.**

Cause: You chose a number less than 256 or that is not a multiple of 32.

Action: When you see the prompt Memory size?, enter a number that is equal to or greater than 256 and is a multiple of 32. The **pcstart** command starts prompting, if it is not already doing so.

023-003   You tried to share or dedicate displays in a combination that is not valid. Only one display can be shared with the primary system display at any given time. Or, no display can be shared if the Coprocessor is using the primary system display.

Cause: The combination of display values you entered is not valid.

Action: The **pcstart** command starts prompting, if it is not already doing so, or the **pcstart** command ends. Respond to the prompts if they appear, or try the **pcstart** command again. For more information, read about displays in "Starting the Coprocessor without Prompts" on page 3-16.

023-004   You tried to assign drive D without assigning drive C.

Cause: If you want to use only one minidisk, you must choose drive C. If you want to use drive D, first choose drive C, then choose drive D.

Action: Verify the minidisk and drive assignments. The **pcstart** command starts prompting, if it is not already doing so.

023-006   You tried to use the same serial port for both the primary and secondary communication ports.

Cause: You tried to assign both the Coprocessor primary and secondary communications ports to the same serial port.

Action: Use a different serial port for each Coprocessor communications port. The **pcstart** command starts prompting, if it is not already doing so.

023-007   **You tried to prevent device *"name"* from being allocated, but the device was not listed for allocation in the customization profile.**

Cause: You typed a -u to bypass allocation of a device listed in the customization profile, but the device you chose is not listed for allocation in the customization profile.

Action: Verify the device name, and try again. The **pcstart** command starts prompting, if it is not already doing so.

023-008   **You tried to allocate more devices than the system allows. You may allocate up to 32 devices.**

Cause: You tried to allocate more devices to the Coprocessor than the system allows.

Action: Do not allocate devices that you do not need. You may need to release some devices. The **pcstart** command starts prompting, if it is not already doing so.

023-009   **You specified "-na", "-nk", or "-nu". These flags are not valid.**

Cause: You typed -n with -a, -u, or -k.

Action: The **pcstart** command starts prompting, if it is not already doing so.

023-010   **You entered a value other than "y" or "n". Please enter "y" for yes or "n" for no.**

Cause: You entered a value other than y or n in response to a system prompt.

Action: Enter a y or an n.

023-011   The "pcstart" command did not complete because the flag you specified is not valid.

Cause: One or more of the flags you entered was incorrect.

Action: The **pcstart** command starts prompting, if it is not already doing so.

023-012   The system cannot find the minidisk "*name*" that you specified. Try "pcstart" again with a correctly spelled minidisk name. Or, create the minidisk and try "pcstart" again.

Cause: You chose a minidisk that has not been created, or you misspelled the minidisk name.

Action: Verify the minidisk name. Create the minidisk or restart the **pcstart** command with the minidisk name spelled correctly.

023-013   The system cannot find the device "*name*" that you specified. Try "pcstart" again with a correctly spelled device name. Or, use "devices" to define the device and try "pcstart" again.

Cause: You chose a device not previously defined in the AIX Operating System.

Action: Verify the device name. Use the **devices** command to define the device, or restart the **pcstart** command with the device name spelled correctly.

023-014   The system cannot read the customization profile
"pcprofile".
Either you do not have read permission to the file
or the file does not exist.

Cause: The customization profile has not been created
in the current directory or is not readable.

Action: Return to the directory which contains your
version of the **pcprofile** file. Try the **pcstart** command
again.

023-015   The system cannot read the *"name"* file.
Make sure that the file exists and you have read
permission to the file, then try "pcstart" again.

Cause: You cannot read the file because you do not
have read access, or because of an I/O error.

Action: Get read access to the file. Try the **pcstart**
command again.

023-016   The system cannot access the Coprocessor
manager because the Personal Computer AT
Coprocessor Services licensed program may not
have been installed correctly. Please reinstall the
Personal Computer AT Coprocessor Services
licensed program.

Cause: The Coprocessor program is installed
incorrectly.

Action: To install the Coprocessor program correctly,
follow the steps in Appendix A, "Installing the Personal
Computer AT Coprocessor Services licensed program" on
page A-1.

023-017   The ″pcstart″ command cannot complete because there is not enough memory currently available. Try ″pcstart″ again and specify less memory. Or, increase the amount of available system memory, then try ″pcstart″ again.

Cause: You chose an amount of memory greater than that which is available on your system.

Action: Request less memory, or create more memory. You can create more memory by physically installing it or by reducing the number of programs running on the IBM RT PC system at the same time as the Coprocessor.

023-018   You cannot redirect communication port ″*name*″ because it is already in use. Try ″pcstart″ again later, or cancel the process that is using the port and try ″pcstart″ again.

Cause: The adapter you tried to use for redirection is not available, probably because another program is using it.

Action: Wait for the adapter to be available, or cancel the program that is using it to make it available. Try the **pcstart** command again.

023-019   You cannot use device ″*name*″ because it is already in use. Try ″pcstart″ again later, or cancel the process that is using the device and try ″pcstart″ again.

Cause: You chose to use a device allocated to some other process.

Action: Wait for the other process to end, or free the device. Try the **pcstart** command again.

023-020   The system cannot initialize BASIC and BIOS. You may have specified too much memory for the Coprocessor, or you do not have permission to read the *"name"* file. Check your memory usage and access permission.

Cause: BASIC and BIOS could not be initialized, either because of insufficient system memory or an error in reading the file.

Action: Verify that enough system memory is available to start the Coprocessor. Or, get read access to the file. Try the **pcstart** command again.

023-021   The *"pcstart"* command cannot complete because the *"name"* display is already in use. Try *"pcstart"* again, and specify a different display. Or, end the application program that is using the display and try *"pcstart"* again.

Cause: The display you chose is not available.

Action: Choose a different display, or end the program that is using the display you want to use, and try the **pcstart** command again.

023-022   You cannot update the customization profile *"name"* because you do not have write permission. Get the proper access permission to the customization profile and make the desired changes.

Cause: You do not have write permission for the customization profile.

Action: Get write permission for the customization profile. Then, try the **pcstart** command again.

023-023   The Coprocessor cannot be started from this
terminal. The Coprocessor must be started from
the system console.

Cause: You entered the **pcstart** command from a
terminal other than the system console.

Action: Use the system console to start the Coprocessor.
If you do not have access to the system console, you
cannot use the Coprocessor.

023-024   The system has created or updated the
customization profile *"name"*.

Cause: The choices you made for the customization
profile were saved as the new default customization
profile.

Action: Continue with your work.

023-027   The Coprocessor has started.

Cause: The Coprocessor program started running. You
can now use it.

Action: Continue with your work.

023-028   The Coprocessor has stopped.

Cause: The Coprocessor program stopped running.

Action: If you need to use the Coprocessor again,
restart the Coprocessor with the **pcstart** command.

023-029   The Coprocessor cannot be started because it is already running, or you do not have permission to use it. Check to see if the Coprocessor is already running.

Cause: The Coprocessor is already running, or you are not authorized to start it.

Action: Check to see if the Coprocessor was already running. Or, get the necessary permissions to start it.

023-030   The "pcstart" command cannot complete because the device "*name*" cannot be used by the Coprocessor. You must first use the "devices" command to designate the device as being available for use by the Coprocessor.

Cause: The device you tried to allocate has not been identified to the Virtual Resource Manager as available to the Coprocessor.

Action: Use the AIX Operating System **devices** command to identify all devices you need to use with the Coprocessor. For more information about the **devices** command, refer to *IBM RT PC Installing and Customizing the AIX Operating System*.

023-031   The "pcstart" command cannot complete because an error occurred in the Define Device Structure of the Coprocessor Device Manager. Make sure the "/etc/ddi/cpmgr" or the "/etc/ddi/coproc" files have not been erroneously updated, or refer to your messages reference book.

Cause: There is an error in the program.

Action: If you can check the **/etc/ddi/cpmgr** file and the **/etc/ddi/coproc** file, you may be able to determine the error. If those two files are correct, install the Personal Computer AT Coprocessor Services licensed program again.

023-032 The "pcstart" command cannot complete because Coprocessor diagnostics found a failure. Run system diagnostics.

Cause: The IBM RT PC system encountered an error.

Action: Run system diagnostics and use *Problem Determination Guide* to help determine the source of the error.

023-033 The "pcstart" command cannot complete because the IODN for device "*name*" in the "etc/system" file is not valid. Delete the device, then add it again, and try "pcstart" again.

Cause: The Input/Output Device number (IODN) is used by the Virtual Resource Manager to identify a device. If it is incorrect, the device cannot be used.

Action: Use the **devices** command to delete the device and add it back. Then, try the **pcstart** command again.

023-034 The "pcstart" command cannot complete because you tried to use the Coprocessor "*name*" communications port as an allocated device "*name*" and also as a redirected communications port. Either do not allocate the "*name*" device, or do not redirect the "*name*" communications port.

Cause: The **pcstart** command cannot complete because you tried to use the Coprocessor communications port as an allocated device and also as a redirected communications port.

Action: Either do not allocate the device, or do not redirect the communications port.

023-035 The "pcstart" command cannot complete because the device characteristics for the *"name"* device are not valid. Delete the *"name"* device, and add it again specifying valid characteristics.

Cause: The device has invalid characteristics.

Action: Use the **devices** command to delete the device and add it again. Make sure that the characteristics you specify are correct. Then try the **pcstart** command again.

023-036 The "pcstart" command cannot complete because the *"name"* device is already allocated. Check in "/etc/system" file for any devices that have the same IODN as device *"name"*. Use "devices" to delete all devices with identical IODNs, and add them again.

Cause: Some devices have the same IODN. Each device must have a unique IODN.

Action: Use a text editor to search the /etc/system file. Make a note of all devices that share an IODN. Use the **devices** command to delete those devices and add them back. The IBM RT PC system automatically assigns a different IODN for each device you add. Then, try the **pcstart** command again.

023-037 You cannot use minidisk *"name"* because it is already in use. Try "pcstart" again later, or cancel the process that is using the minidisk and try "pcstart" again.

Cause: The minidisk is being used by another process on the IBM RT PC system.

Action: Wait for the process that is using minidisk to finish, or cancel the process that is using it. Then try the **pcstart** command again.

023-038 The "pcstart" command cannot complete because the same minidisk has been allocated to both drive C and D. Allocate different minidisks for each drive, or use only drive C. Refer to your messages reference book for more information.

Cause: You assigned the same minidisk to both drive C and drive D, or the minidisks you assigned to drive C and drive D have the same IODN.

Action: Try the **pcstart** command again, and use different minidisks for drive C and drive D. Or, allocate a minidisk to drive C only. If you use two different minidisks and get this message, take the following steps:

1. Backup each minidisk.

2. Use the **minidisks** command to delete each minidisk.

3. Use the **minidisks** command to create two new minidisks.

4. Restore the information you copied in step 1 to each minidisk.

023-039 The "pcstart" command cannot complete because the IODN for minidisk "*name*" is not valid. Try "pcstart" again specifying a different minidisk. Or delete minidisk "*name*", create a new one and try "pcstart" again.

Cause: The IODN for the minidisk is not valid.

Action: Use the **pcstart** command again and assign a different minidisk (or no minidisk). If you need to correct the existing minidisk, use the following steps:

1. Backup the minidisk.

2. Use the **minidisks** command to delete the minidisk.

3. Use the **minidisks** command to create a new minidisk.

4. Restore the information you copied in step 1 to the minidisk.

023-040 The "pcstart" command cannot complete because a disk I/O error was detected while trying to allocate minidisk "*name*". Try the command again. If you get this message again, run system diagnostics.

Cause: The IBM RT PC system encountered a disk I/O error. It may be a temporary problem or the result of physical damage.

Action: Try the **pcstart** command again. If the message occurs twice, run the system diagnostics.

023-041   The "pcstart" command cannot complete because
the Define Device Structure is not properly
initialized for communication redirection.
Re-install the Personal Computer AT Coprocessor
Services licensed program and try "pcstart" again.

Cause: The Define Device Structure is part of the
Coprocessor program. It is installed incorrectly.

Action: Follow the installation steps provided with the
Coprocessor program to install the program again.
Then, try the **pcstart** command again.

023-042   The "pcstart" command cannot complete because
the "cpasynca" and "cpasyncb" stanzas in the
"etc/system" file refer to the same physical port.
Re-install the Personal Computer AT Coprocessor
Services licensed program and try "pcstart" again.

Cause: You chose to redirect the two communications
ports, but an error in the **etc/system** file makes the two
IBM RT PC ports indistinguishable.

Action: To install the Coprocessor program correctly,
follow the steps in Appendix A, "Installing the Personal
Computer AT Coprocessor Services licensed program" on
page A-1.

023-043 The application program running on the Coprocessor tried to access a device that has not been previously allocated to the Coprocessor. The following information may be useful in diagnosing the problem:

> Operation code = "xxxx"
> I/O address = "yyyy"
> I/O data = "zzzz".

Cause: The program running on the Coprocessor tried to access a device that was not allocated to the Coprocessor using the **pcstart** command. The Coprocessor continues to run. The program you are using on the Coprocessor may or may not continue to run.

Action: You may be able to run the program successfully by using the **pcstart** command and allocating all the necessary devices. If not, you see this message again. If you can modify the program itself, the information provided in this message may help determine the cause of the error. Or, try the **pcstart** command again and choose **-nw**.

Note: For a list of I/O addresses, see the "I/O Address Map" figure in *Options Installation*.

023-045 The "pcstart" command cannot complete because device "*name*" has the same IODN as "cpasync1" or "cpasync2". Use "devices" to delete "*name*" and add it again.

Cause: The device specified in the message has the same IODN as **cpasync1** or **cpasync2**.

Action: Use the **devices** command to delete the device and add the device again. Then, try the **pcstart** command again.

023-090   The "installp" command cannot complete because the processor card does not support the Personal Computer AT Coprocessor Option, or because an error occurred while reading the read-only storage (ROS) on the processor card.

Cause: The BIOS for the Coprocessor is stored in ROS on the 032 Microprocessor. The **installp** command loads the BIOS on a fixed disk. If the BIOS is not in ROS, or if it could not be read, the **installp** command cannot complete.

Action: Follow your local procedures for reporting hardware problems.

023-099   The Coprocessor has been stopped because a software error was detected. Please refer to the error log for more information.

Cause: The IBM RT PC system encountered a software error.

Action: Refer to *Problem Determination Guide*.

Figures

Glossary

adapter. An electronic part used to connect two unlike parts or machines.

allocate. To assign a resource, such as a disk file or a diskette file, to perform a specific task.

All Points Addressable (APA) display. A display that allows each pel to be individually addressed. An APA display allows for images to be displayed that are not made up of images predefined in character boxes.

BASIC (Beginner's All-Purpose Symbolic Instruction Code). A programming language designed for interactive systems. Originally developed at Dartmouth College to encourage people to use computers for simple problem-solving operations.

bus. One or more conductors used for transmitting signals or power.

byte. The amount of storage required to represent one character; a byte is 8 bits.

command. A request to perform an operation or run a program.

communications adapter. A hardware feature enabling a computer or device to become a part of a data communications network.

compatibility. The ability to perform tasks identically in different environments without major modifications.

configuration. The group of machines, devices, and programs that make up a computer system. See also *customize*.

customize. To describe (to the system) the devices, programs, users, and user defaults for a particular data processing system.

device. An electrical or electronic machine that is designed for a specific purpose and that attaches to your computer, for example, a printer, plotter, disk drive, and so forth.

DOS. In this book, the Disk Operating System used on the IBM Personal Computer AT.

emulation. Imitation; for example, when one computer imitates the characteristics of another computer.

enter. To send information to the computer by pressing the Enter key.

fixed disk. A flat, circular, nonremoveable plate with a magnetizable surface layer on which data can be stored by magnetic recording.

flag. A modifier that appears on a command line with the command name that defines the action of the command. Flags in the AIX Operating System almost always are preceded by a dash.

memory. Storage on electronic chips. Examples of memory are random access memory (RAM), read only memory (ROM), or registers.

message. A response from the system to inform the operator of a condition which may affect further processing of a current program.

minidisk. A logical division of a fixed disk that may be further subdivided into one or more partitions. See *partition*.

network. A collection of products connected by communication lines for information exchange between locations.

partition. In DOS, a logical division of a minidisk.

port. An access point for data input to or data output from a computer system.

profile. (1) A file containing customized settings for a system or user. (2) Data describing the significant features of a user, program, or device.

program. A document containing a set of instructions, conforming to a particular programming language syntax.

prompt. A displayed request for information or user action.

redirect. To divert data from a process to a file or device to which it would not normally go.

run. To cause a program, utility, or other machine function to be performed.

security. The protection of data, system operations, and devices from accidental or intentional ruin, damage, or exposure.

template. A representation of a keyboard that includes functions not engraved on the keyboard.

timing-dependent. In a program, relying on the amount of time it takes to perform a certain function.

virtual resource manager (VRM). A set of programs that manage the hardware resources (main storage, disk storage, display stations, and printers) of the system so that these resources can be used independently of each other.

virtual terminal. Any of several logical equivalents of a display station available at a single physical display station.

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